



PRODUCT DATA SHEET

KPD-74

KORDON'S BREATHING BAGS

PRODUCT DESCRIPTION:

The Kordon® Breathing Bag represents a new approach to the problems of shipping live fishes and other aquatic animals over long distances or for extended time periods. The product development staff at Kordon, teamed with plastics chemical engineers, have taken a technology first developed in space/military research and refined it to produce the bags being offered today. The Breathing Bag allows the transfer of simple and complex gas molecules through the plastic wall of the bag -- carbon dioxide and oxygen in particular, as well as other gases - providing a true "breathing" bag in place of a "barrier" bag. As long as there is a normal breathable atmosphere outside the Breathing Bag, the animals inside will not run out of oxygen. Carbon dioxide exits the bags at 4 times the rate oxygen enters the bags, thereby constantly purging the water of toxic carbon dioxide, and allowing oxygen to replace it in the water. Kordon has shipped millions of bags (termed "Sachets") of living foods (tubifex worms, brine shrimp, daphnia, glass worms, etc.) for aquarium fishes using the Breathing Bag technology.

Prior to this invention, the only plastic bags available for shipping fishes were made of polyethylene and had no mechanism to allow the passage of gasses through the bag wall. When using these "barrier" bags, any oxygen must-of necessity-be added as a gas inside the bag prior to sealing. This process has many problems. High concentrations of oxygen can cause flammable conditions. The presence of oxygen inside the bag takes up a lot of valuable shipping space. Once the supplied oxygen is used up there is no more available. Toxic carbon dioxide from the fishes' breathing builds up in the water, displacing the oxygen. The oxygenated air in the bags may not be satisfactory for fishes' breathing, because (particularly from sources in underdeveloped countries), the bottled oxygen may be contaminated. A bag partially full of water with the rest filled with oxygen allows the contents to slosh during transport, stressing fishes.

CHARACTERISTICS:

The plastic in the "Breathing Bags" is very tough and flexible. The thickness is 1.5 ml for the regular bags and 3 ml for the liner bag. Small punctures such as from fish spines often do not penetrate the plastic, and if they do, the molecular structure of the plastic tends to realign and reduce the size of the holes or reseal itself. Some fishes may damage the bag film enough to cause leaks. Only experimentation and experience will determine which individual species of fishes are safe to transport. Kordon is experimenting with a heavier walled and perforated liner bag to fit inside the Breathing Bag to help with the puncture problem. For most smaller spiny fishes it is sufficient to multiple bag them, Breathing Bag within Breathing Bag, preferably with the inner bag wrapped in one or more layers of newspaper. There is a proportionate loss of breathability (up to approximately 50%) for one bag inside another, which will affect different animals differently. The user should experiment to find acceptable conditions for multiple bagging.

Breathing Bags function well when packed in conventional foam plastic or corrugated boxes. Foam and cardboard boxes have a high rate of breathability, even if these containers are sealed with tape. Air is normally over 20% oxygen, which is over 200,000 ppm (parts per million). Aquatic invertebrates and fishes normally have only about 4-14 ppm oxygen available to them in water. It takes only a small amount of air passing through the packaging materials to sufficiently oxygenate the water in the Breathing Bags. This is even true for shipping boxes in an air cargo space that is not pressurized. There is usually sufficient oxygen at higher altitudes for the aquatic life in the Breathing Bags. If it is required, additional oxygen can be added to the Breathing Bag as is done in the traditional barrier bag. The Breathing Bag will retain the oxygen for several days.

Higher temperatures increase the "breathability" of the bags, the rate at which oxygen and carbon dioxide is exchanged.



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When packing individual bags in shipping containers, it is best to separate each bag, such as with flat pieces of corrugated cardboard or layers of newspaper, so that as much bag surface area as possible is exposed to the air in the shipping container.

Breathing Bags should not be shipped inside a "barrier" type liner bag. The barrier effect of the outer bag will prevent the Breathing Bags from performing properly.

During tests, fishes, both freshwater and marine have survived for several weeks and successive flights. However, there is no uniform answer as to how long any individual shipment will survive using Breathing Bags. There are far too many variables. It is suggested that tests be conducted at the user's facility to determine the proper parameters for successful use of these bags.

METHODS FOR USE:

After adding water and fishes, seal the bag with as little airspace as possible.

Except for those few kinds of fishes that are made uncomfortable by the lack of an air space at the surface, fishes adapt readily to the lack of an airspace and it is not needed. It is best if there is no air pocket in the bag so that there is no water movement, keeping the fishes calmer. An unneeded air space also uses up valuable shipping space.

Breathing bags can be sealed using all of the current methods: rubber bands, twist ties, metal clips, etc. An excellent way for fast efficient sealing is with a bar type heat sealer. The plastic used in the "Breathing Bags" readily seals with heat. Heat sealing can be done much more quickly than other methods and greatly increases the speed with which bags can be handled and sealed. For those sealing many bags for shipment the change will be a dramatic reduction in labor.

The proper use of certain water conditioners will greatly enhance the effectiveness of the Breathing Bags. Either a combination of AmQuel® and NovAqua® or AmQuel and PolyAqua® with a suitable antibiotic (Kordon has found Neomycin to be among the best of the antibiotics for universal usage) has proven the most effective. All the Kordon "Sachets" have special combinations of additives to increase the well being and survival of the inhabitants. These additives are in the process of being marketed under the general trade name of "Kordon Aquatic Life Saver". There are separate products for freshwater and marine conditions..

OTHER USES:

Kordon's Breathing Bags are highly recommended for transporting aquatic plants. Plants need to transpire just as animals do, and they expel toxic gases during shipment that, if not eliminated, are injurious to them. Breathing Bags eliminate this problem. It is recommended that the plants be dipped in diluted Kordon PolyAqua to keep the plants moist and to help them in their respiration.